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NASA Space Technology Mission Directorate

NASA INNOVATIVE ADVANCED CONCEPTS

FY17 NIAC PHASE I SOLICITATION VIRTUAL FORUM

August 18, 2016 - 2:00 to 3:00 PM

Jason Derleth, NIAC Program Executive
Alvin Yew, NIAC Program Manager
Ronald Turner, NIAC Senior Science Advisor
Katherine Reilly, NIAC Strategic Partnerships Manager
Barbara Mader, NIAC Budget Analyst

NASA Headquarters - Washington, DC

NIAC NASA Innovative Advanced Concepts

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NIAC Program Personnel

A "Renaissance Team" with diverse, multidisciplinary backgrounds

- **Jason Derleth**
  Program Executive
- **Dr. Alvin Yew**
  Program Manager
- **Dr. Ron Turner**
  Senior Science Advisor
- **Kathy Reilly**
  Strategic Partnerships Manager
- **Barbara Mader**
  NIAC Budget Analyst

National Aeronautics and Space Administration

Space Technology Mission Directorate (STMD)

Space Tech Portfolio

Space Technology Mission Directorate (STMD) Programs

Transformative & Crosscutting Technology Breakthroughs

Technology Demonstration Missions
bridges the gap between early proof-of-concept tests and the final infusion of cost-effective, revolutionary technologies into successful NASA, government and commercial space missions.

Small Spacecraft Technology Program
develops and demonstrates new capabilities employing the unique features of small spacecraft for science, exploration and space operations.

Game Changing Development
seeks to identify and rapidly mature innovative/high impact capabilities and technologies that may lead to entirely new approaches for the Agency's broad array of future space missions.

Pioneering Concepts/Developing Innovation Community

NASA Innovative Advanced Concepts (NIAC)
nurtures visionary ideas that could transform future NASA missions with the creation of breakthroughs—radically better or entirely new aerospace concepts–while engaging America's innovators and entrepreneurs as partners in the journey.

Space Technology Research Grants
seek to accelerate the development of "push" technologies to support future space science and exploration needs through innovative efforts with high risk/high payoff while developing the next generation of innovators through grants and fellowships.

Center Innovation Fund
stimulates and encourages creativity and innovation within the NASA Centers by addressing the technology needs of the Agency and the Nation. Funds are invested to each NASA Center to support emerging technologies and creative initiatives that leverage Center talent and capabilities.

Creating Markets & Growing Innovation Economy

Centennial Challenges
directly engages nontraditional sources advancing technologies of value to NASA's missions and to the aerospace community. The program offers challenges set up as competitions that award prize money to the individuals or teams that achieve a specified technology challenge.

Flight Opportunities
facilitates the progress of space technologies toward flight readiness status through testing in space-relevant environments. The program fosters development of the commercial reusable suborbital transportation industry.

Small Business Innovation Research (SBIR) and **Small Business Technology Transfer (STTR)**
Programs provide an opportunity for small, high technology companies and research institutions to develop key technologies addressing the Agency's needs and developing the Nation's innovation economy.

NIAC is Unique!

- NIAC is more than a **research grant**
- We aim for **revolutionary** ideas that may significantly enhance or conceive of entirely new, future missions
- We are a **fellowship** that encourages sharing and collaborations. We are a transparent program.
- **The public loves NIAC**, and the press frequently reports on our concepts

THE GREATER NIAC COMMUNITY

We understand the power of interdisciplinary research and encourage 'cross-pollination' among our Fellows

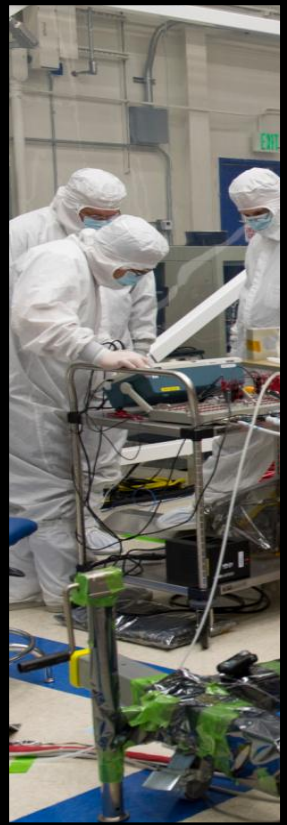
NIAC: Funding Innovation across the Nation

Universities

National Labs

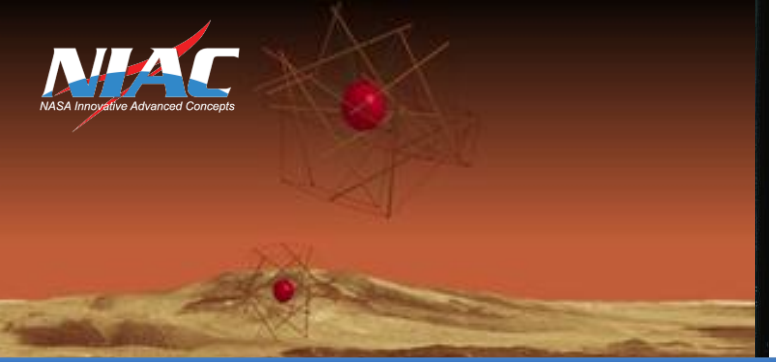
Industry

Small Businesses



NASA Researchers

Individuals & Garage Inventors



Bayandor: Multi-use Planetary Probe

- Tensegrity structure serves as frame for a lightweight heat shield and transforms into a surface rover

Mann: Stellar Echo of Exoplanets

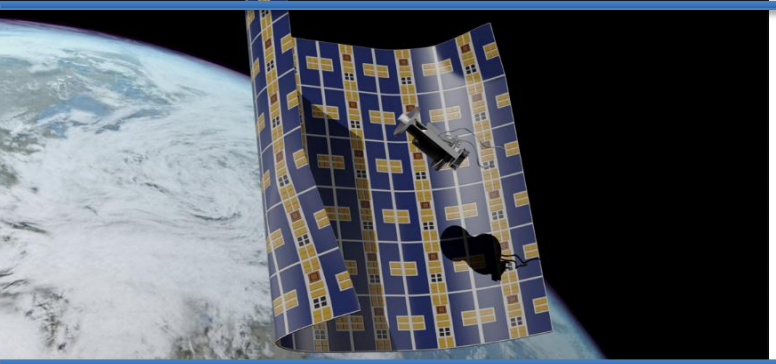
- Detect exosolar structures using echoes produced by solar intensity fluctuations

Dunn: Asteroid Space Ship

- Use ISRU to convert asteroids into autonomous mechanical spacecraft

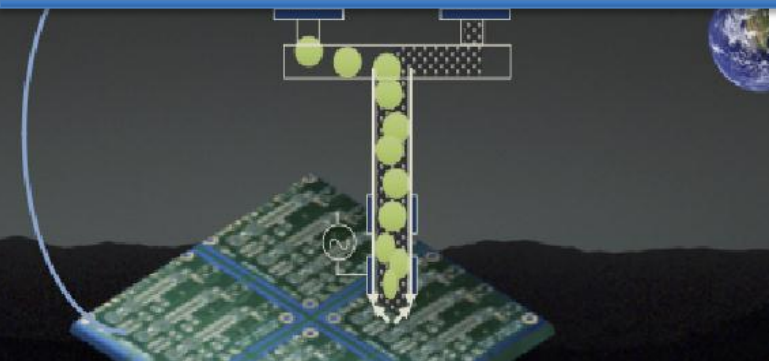
Thomas: Pluto Orbiter & Lander

- Provide both propulsion and energy using a fusion drive to reduce the transit to Pluto and enable landing



Janson: Brane Craft

- Develop a large, membrane spacecraft with onboard propulsion and actuators to deorbit space debris



Rothschild: Bio-Recycling & Printing

- Use reprogrammed microorganisms to recycle and create electronics on Mars

Solicitation Key Information

NIAC
NASA Innovative Advanced Concepts

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NIAC Awards, Scope, Criteria

- **NIAC supports two phases of study:**
  - **Phase I:** up to **$125K, ~9 months**, for concept definition and initial analysis
  - **Phase II:** up to **$500K, 2 years**, for further development of most promising Phase I concepts, comparative mission analysis, pathways forward

- **Scope of NIAC Phase I Studies:**
  - Visionary concepts that address NASA's or the nation's goals
  - Offer radically different approaches or leapfrog innovations to enable new missions or greatly enhance previous ones
  - A concept: new technology framed in a **mission context**

- **NIAC proposal evaluation criteria:**
  1. Proposed concepts must demonstrate innovation
  2. It must have a clear potential impact in transforming future missions
  3. The proposed study must employ an appropriate technical approach
  4. The concept must demonstrate other non-technical benefits

What's the process?

The NIAC Phase I Process: A two-step call

STEP A

3-page whitepaper describing your technology development concept in a Mission Context

We review the Step A Proposals and invite the best proposals to STEP B

STEP B

8-page proposal detailing your concept and describing the work you would do

The Step B proposals are reviewed by an expert panel, ranked, and presented to the Source Selection Official at NASA HQ, who makes the final selection of projects

Selected Studies are awarded $125K for a 9-month Study, and the Principal Investigator earns the title, "NIAC Fellow"

Are there examples of things NIAC doesn't want?

Yes! The NRA has a list of studies that NIAC doesn't fund.

It is very important to pay attention to this list.

Failure to do so may mean your proposal WILL NOT BE INVITED to STEP B.

TOP 10 REASONS a proposal WILL NOT BE INVITED to STEP B

Reason # 10 (1.4%): No Aerospace focus

Fails to sufficiently address NASA goals or benefit the wider aerospace community

Reason # 9 (3.4%): Unclear Concept

Fails to present a specific innovative concept.

Reason # 8 (3.8%): Not Programmatically Credible

No reasonable path to implementation, without acknowledging the barriers (e.g., requiring unrealistic budgets or policy changes) and offering a sufficiently plausible approach.

Reason # 7 (4.8%): Tool or Process

Primary focus appears to be development of tools or processes to improve design, decisions, or technical capabilities. NIAC studies must focus on developing specific aerospace concepts.

Percentages are from the 2015 Call for Proposals

TOP 10 REASONS a proposal WILL NOT BE INVITED to STEP B

Reason # 6 (6.3%): Not Technically Credible

Conflicts with established physics or engineering principles, without acknowledging this and offering a sufficiently plausible defense.

Reason # 5 (8.7%): Experiment or Research

Primary focus appears to be experimentation or analysis, not concept development. Tests, derivations, characterization of properties, and algorithm development are common examples. NIAC studies often involve some such efforts, but they must not overshadow the study goal to establish concept feasibility in a mission context.

Reason # 4 (12.0%): Previously Studied

Revisits a previously studied concept, without identifying a new factor that substantially differentiates the proposal from prior efforts.

Percentages are from the 2015 Call for Proposals

TOP 10 REASONS a proposal WILL NOT BE INVITED to STEP B

Reason # 3 (12.5%): Narrowly Focused Technology

Too narrowly focused on technology, subsystems, or investigations of smaller scope (e.g., components, instruments, materials). Some focused analysis may be appropriate to establish the credibility of the underlying innovation, but it must not overshadow the study goal to establish concept feasibility in a mission context.

Reason # 2 (21.2%): Incremental

Proposes typical next steps or aims at only modest improvement, rather than investigating far-term or high-risk "breakthrough" concepts.

Reason # 1 (26.0%): Unclear Mission Application

Fails to identify or propose to study at least one application for which the proposed concept might be used.

Percentages are from the 2015 Call for Proposals

Key Dates

- **Release: August 2, 2016**
- **NIAC Virtual Q&A Forum: August 18, 2016**
- **Step A Proposal Due: September 15, 2016**
- **Step B Invitations Issued: October 18, 2016 (Target)**
- **Step B Proposal Due: November 17, 2016 (Target)**
- **Selection Announcement: March 28, 2017 (Target)**
- **Award: May 9, 2017 (Target)**

Phase I Deliverables

- **Brief status reports every quarter**
- **A final written technical report**
- **Mandatory attendance at two program meetings**


NASA
GSAT 34 # L36-3032W1-00067-5
Thinking Ahead to Phase II
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NIAC Awards: Ph I and Ph II

Phase I and Phase II Research

PHASE I Research

Call opens: Summer

- Up to **$125K**
- ~ **9 MONTHS** for concept definition and initial analysis in a mission context

PHASE II Research

Call opens: Winter

- Up to **$500K**
- ~ **2 YEARS** for further development of most promising Phase I concepts, comparative mission analysis, pathways forward, spin off technologies

A Proposed Phase II Study must…

- **Continue to develop the concept studied in the Phase I award** — refinements or advances identified in the Phase I effort are expected to be incorporated in the Phase II concept, but it must be essentially based on the Phase I award concept.
- **Continue to assess the concept in a mission context** — the main focus should be determining feasibility and comparing properties/performance with those of current missions/concepts. Concepts that may support multiple missions should discuss the range, but must feature detailed analysis for at least one candidate mission.
- **Assess the programmatic benefits and cost versus performance of the proposed concept** — show the relationship between the concept's complexity and its benefits, cost, and performance.
- **Develop a pathway for development of a technology roadmap and identify the key enabling technologies**


The NASA Innovative Advanced Concepts Program:
• Pioneering concepts
• Developing innovations to help mankind on Earth and in Space
• Early studies of visionary aerospace architecture, mission, and system concepts
Credit: P. Rubin, A. Longman

The Future Possibilities Depend on YOU

NIAC is the most open-ended and far-reaching of NASA's new technology programs

This exciting program is open to *anyone* in the US

(international researchers may team, but no exchange of funds)

changing the possible

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